

disappears. He thinks the occurrence of evolutionary parallelism is itself an indicator of relationships and should be taken into account. The evidence for the adaptive significance of many of the character combinations that distinguish orders and families leaves him distinctly unsatisfied, and he repeatedly wonders aloud if the unfashionable concept of "evolutionary momentum" (orthogenesis?) may not play a role where selective impetus is obscure or undemonstrated.

He believes that angiosperms are a monophyletic group with ancestors somewhere in the seed ferns, and that the primitive flowering plants were woody and probably arborescent dicotyledons with magnolian/ranalian characteristics. Monocotyledons must have been derived from aquatic dicotyledons which had lost their cambium and hence the capacity to produce secondary growth and vessels in the normal way; monocot leaves developed from modification of a bladeless petiole. Consistent with his emphasis on consensus, Cronquist has adopted in major outline the system proposed by Takhtajan (Taxon 13: 160-164. 1954). The angiosperms (re-christened Magnoliophyta by Cronquist) are divided into dicots (Magnoliatae) and monocots (Liliatae). The dicotyledons are construed as consisting of 6 subclasses—Magnoliidae, Hamamelidae, Caryophyllidae, Dilleniidae, Rosidae, and Asteridae—and the monocotyledons as comprising 4 subclasses—Alismatidae, Commelinidae, Arecidae, and Liliidae. Whereas Takhtajan admitted 61 orders of dicots and 21 orders of monocots for a total of 82, Cronquist accepts 56 orders of the former group and 18 of the latter for a total of 74. Thorne, incidentally, eschews subclasses but recognizes 19 superorders and 43 orders of dicots and 5 superorders and 11 orders of monocots for a total of 54 orders. Although a good many differences in treatment do in fact exist between the first two of these arrangements, and even more between them and the last, the similarities are vastly more striking than are the differences. As Cronquist remarks, "We are all—or nearly all—Besseyans." It appears that we may be in danger of becoming Takhtajanians, as well.

Cronquist provides keys to the subclasses, to the orders, and to the component families. These must obviously allow for many exceptions, but they are useful. The selective bibliography accompanying the discussion of each order should prove to be even more useful. The writing is clear, concise, and positive, but the difficulties with various taxonomic dispositions and the possibility of alternative choices are pointed out frankly. The really fascinating aspect of the book is the opportunity afforded in the running discussions of orders to find out what has happened to the groups of one's particular interest. If there is any danger in the treatment, it is that so many of the long-standing controversies and indecisions seem to have been resolved so easily and logically. It should be rewarding to see whether consensus widens or diminishes as other books involving comparable schemes of classification appear, as they surely will. For the present, Cronquist has given us a very useful, well written, and stimulating volume in an uncrowded field of endeavor. —LINCOLN CONSTANCE
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Flora of Alaska and Neighboring Territories. By ERIC HULTÉN. xxii + 1008 pp., illustrated. Stanford Univ. Press. 1968. \$35.00.

Eric Hultén's preeminence among students of the Alaskan flora is a present-day example of how floristics research in a state or region tends to be dominated, for long periods of time, by the outstanding work of a single individual. Although Professor Hultén's principal interests, by his own admission, have been in the phytogeography of circumboreal floras, he has contributed to taxonomy such important references as the *Flora of Kamchatka (1927-1930)*, *Flora of the Aleutian Islands (1937, 1960)*, and *Flora of Alaska and Yukon (1941-1950)*. As those who have used these books know, their purpose was to document scientifically the literature, collections, nomenclature and distribution of arctic plants; and descriptions, illustrations and keys are generally lacking.

In a charmingly personal preface to the present book, Hultén tells how he decided to prepare what would be “. . . a flora of another character . . . one that would serve a larger public.” This work, *Flora of Alaska and Neighboring Territories*, is in all respects a great achievement. As a manual its primary purpose is that of plant identification, and this is accomplished through concise keys, descriptions and illustrations of all the species and most infraspecific taxa of Alaskan higher plants (spermatophytes and vascular cryptogams). Other essentials are also included—keys to families and genera, a glossary of terms, a list of botanical authorities, and bibliography. Especially remarkable, however, is the book's content of phytogeographical information, given in paired range maps for each taxon—a dot map of the area covered by the manual, and an outline map of each entity's complete circumpolar range. These are Hultén's unique contributions, derived from more than 40 years of study of boreal floras and they add a highly useful dimension that is rarely found in regional floristic manuals.

Alaska is a very large place, and a large book is required to do justice to it. What are the statistics of this flora? The area covered is Alaska, including the Aleutian Islands, Yukon Territory, the northwest tip of British Columbia, and the Chukchi Peninsula of Siberia—a total of 1,022,400 square miles. In it are, “Some 1,974 distinct, taxonomically named plants, belonging to 1,559 species, 412 genera, and 89 families . . .” The book also mentions hundreds of hybrids and over 200 closely related taxa occurring in neighboring boreal regions. Not only are there large latitudinal and altitudinal differences within this area, but the land is geologically complex and includes major sections that were free of ice during the last two glacial maxima. The importance of its central position in the migration route between the Old and the New Worlds hardly needs mentioning. What better vantage point is there to view, in panorama, the history and relationships of northern plant species?

“A general condition of the flora of this region is that the morphological variation of a given taxon is greater in Alaska than in other parts of its range.” Hultén's taxonomic approach to this complex flora makes use of two traditional tools: a conservative view of species, and a concept of subspecies as the major morphologically recognizable, geographical divisions of a species. Because the author has so extensively revised the nomenclature of the flora, particularly at the subspecific level, every reviewer will find much to comment on in groups he knows at first hand. Species that we in the Pacific Northwest have recognized as distinct may run northward and intergrade with others in Alaska or elsewhere in the arctic. As a result we find, for example, *Populus trichocarpa* made a subspecies of *P. balsamifera*, ‘*Beckmannia syzigachne*’ submerged in an asiatic subspecies of *B. eruciformis*, and *Phylodoce glanduliflora* reduced to a subspecies of *P. aleutica*. Even more notable is Hultén's synonymizing of *Aster foliaceus* with *A. subspicatus*; the types of both of these are Alaskan and rather similar, but farther south the names are applied to two very distinct entities. Although such unions appear justified, one wonders about other cases where evidence of intergradation is slighted and the plants are kept as distinct species. *Tiarella trifoliata* and *T. unifoliata* were shown by Kern to be interfertile and intergrading, yet they are recognized here as species. *Amelanchier florida* was placed by Hitchcock as a subspecies of *A. alnifolia* on the basis of their evident intergradation, and they are not convincingly distinguished by Hultén's descriptions and illustrations. In *Saxifraga*, intergradation is admitted between *S. davurica* and *S. unalaschensis*, yet they are kept as species. A similar relationship seems to exist between *Hieracium triste* and *H. gracile*, which nonetheless are not merged by Hultén. Very minor differences, principally of pubescence, appear to mark the two species recognized in *Romanzoffia* as well as the three of *Douglasia*, whose geographical relationships resemble those of subspecies.

Some interesting changes in generic alignments can be noted, but fortunately these are minimal. The treatment is conservative in groups like *Lycopodium*, *Claytonia*, and *Chrysanthemum-Tanacetum*. *Minuartia* is divided from *Arenaria*, *Podagrostis* from *Argostis*, and *Platanthera* from *Habenaria*, however. Hultén's conservative

handling of apomictic and hybridizing groups is important in reducing the number of named microspecies. In the difficult genus *Salix* there are 56 taxa described, in *Antennaria* there are 19, in *Arnica* 17, and in *Taraxacum* only 11.

Many of the author's nomenclatural changes appear to be derived from a rather long paper published in *Arkiv för Botanik*, in 1967. Not having this paper available, I have only noted a few of what appear to me to be unusual selections of names for this flora. *Alnus oregona* should be *A. rubra* Bong., for example, the *Betula Alnus rubra* of Marshall being no homonym of the latter name. *Stachys emersonii* is used by Hultén, although from Epling's examination of the type it appears that *S. mexicana* Benth. is an earlier name for this species. Finally, *Echinopanax* is used in place of *Oplopanax*, although A. C. Smith, in the *Flora of North America*, states that the former is a *nomen nudum*. The editorial work on this book is, overall, so excellently done that it is mere nit-picking to call attention to minor errors. In a few cases, however, illustrations seem to be significantly at variance with plant descriptions; these were noticed for *Ranunculus trichophyllus* var. *trichophyllus*, where floating leaves are not lacking from the drawing, for *Amelanchier*, where the key leaf-shape differences are not apparent, and for *Linnaea borealis* ssp. *longiflora*, whose leaves are hardly "elliptical, acute." On the range maps, the circumpolar distribution of *Papaver nudicaule* is omitted, as is the occurrence on the Gaspé Peninsula of *Agoseris aurantiaca*.

This review would be incomplete without the simple statement that *Flora of Alaska* is a beautiful book! The difficult job of arranging keys, drawings, maps and text has been solved with neatness and economy of space. Luxurious additions are the physiographic maps on the end-boards and a section of superb colored plates from photographs by the author. Among many small but helpful details in the book are the habitat notes and information on type localities provided for all taxa, an index of common names, and pronunciation guides for the scientific names. With such careful attention to details evident throughout the work, two omissions stand out quite noticeably—there are no generic descriptions and no index to synonyms. The latter would have helped this reviewer discover how the genus *Youngia* came to be lost, before he noticed that its only North American species, *Y. americana*, resides on page 956 in the synonymy of *Crepis nana*.

It will be apparent to all who use this book that the Alaskan flora contains a goldmine of biosystematic problems that have hardly been touched. Hultén has brought to a high level of refinement the taxonomic knowledge that can be gained from morphological and geographical evidence, but the genetic, cytological and biochemical information necessary for a total synthesis of relationship is largely lacking. The difficulties of integrating biosystematic data with existing morphological categories are already clear from what is known of the cytotaxonomy of such "difficult" groups as *Epilobium angustifolium* (Mosquin), *Calamagrostis canadensis* (Löve, Mitchell, and others) and *Achillea millefolium*, sens. lat. (Ehrendorfer, Mulligan and Basset). The flora of Alaska will amply repay careful study by generations of future botanists, all of whom will be indebted to Eric Hultén for this landmark in the botany of North America. —KENTON L. CHAMBERS, Oregon State University, Corvallis.